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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Examination (Regular and Supplementary), December 2020

Course Code: EE311

Course Name: ELECTRICAL DRIVES & CONTROL FOR AUTOMATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1 a) A 4 pole lap wound d,c generator has 960 total number of turns. The useful flux per pole is 0.09 Wb. The armature resistance is 0.05 Ω. Calculate the terminal voltage when running at 1000 r.p.m. if the armature current is 30 A. (2)

b) What are the different methods of excitation in a d.c generator? Explain. (4)

c) Explain about the main parts of a d.c. generator. (4)

2 a) The Induced e.m.f. in a d.c. shunt generator on open circuit condition is given as 150V. When the machine is on load, the terminal voltage is 142V. Find the load current if the field resistance is 20 Ω and the armature resistance is 0.04 Ω. Ignore armature reaction. (2)

b) What is armature reaction in dc generator and what are its effects and how it can be reduced. (4)

c) Briefly explain the Internal and External characteristics of d.c .shunt and series generators. (4)

3 a) A 6-pole lap wound d.c. motor with 774 conductors. takes an armature current of 100 A at 440V.The armature resistance is 0.2Ω. The flux per pole is 0.08 Wb. Calculate (i) the speed and (ii) Armature torque developed. (3)

b) Explain the necessity of a starter for d.c.motors. (3)

c) Explain the electrical and mechanical characteristics of dc shunt motor and d.c. series motor. (4)

4 a) Explain the load test of a d.c. shunt motor. (3)

b) A 220 V series motor takes an armature current of 40A. The armature resistance is 0.2Ω and series field resistance is 0.06Ω. Find the (4)

(i) output power and the (ii) efficiency if the copper losses are equal to Iron and friction losses.

c) List the different losses in a d.c. machine and derive the condition for maximum efficiency. (3)

PART B

Answer any three full questions, each carries 10 marks.

5 a) Define all day efficiency of a transformer. (2)

b) A 60 kVA transformer has iron loss of 550W and full load copper loss of 800W.Find the efficiency corresponds to full load, if the full load power factor is 0.7 lagging. (2)

c) Explain open circuit and short circuit test of a single-phase transformer with suitable diagrams. (6)

6 a) Derive the e.m.f equation of a transformer. (4)

b) Draw the equivalent circuit of a loaded Transformer referred to primary side and also give the necessary equations. (6)

7 a) Explain the constructional details of three phase Induction motor. (5)

b) Derive the Torque equation for a three-phase induction motor. (5)

8 a) Define the term slip of an induction motor and calculate the percentage slip of a 4 pole Induction motor supplied by a 415 V, 50Hz supply, running at 1440 r.p.m. (2)

b) Explain the tests to be conducted on a 3-phase induction motor for the development of circle diagram. (5)

c) Describe autotransformer starting of a three phase Induction motor with neat sketches. (3)

PART C

Answer any four full questions, each carries 10 marks.

9 a) Explain the working principle of synchronous motor. (3)

b) With neat diagram explain the working of capacitor start single phase induction motor. (4)

c) Describe synchronous impedance related to an alternator. (3)

10 a) Explain the e.m.f. method of determining the regulation of an alternator. (6)

	b)	Explain the working of a universal motor with the help of its diagram.	(4)
11	a)	Derive emf equation of an alternator.	(4)
	b)	Draw and explain V curves of a synchronous motor.	(3)
	c)	Single phase induction motor is not self-starting. Why?	(3)
12	a)	Explain the working of (i) Linear stepper motor and Hybrid stepper motor with suitable diagrams.	(7)
	b)	Explain Digital control used for automation.	(3)
13	a)	Explain the working of variable reluctance stepper motor with neat diagram.	(6)
	b)	Explain the significance of Digital Signal Processor.	(4)
14	a)	Explain programmable logic controllers with block diagram.	(7)
	b)	Describe the working principle of stepper motor.	(3)

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